

2-2009

# Right Whale AIS Project (RAP): Acoustic Detections in the Boston Approaches

Kurt Schwehr

*University of New Hampshire, Durham*

Lee Alexander

*University of New Hampshire, Durham, [lee.alexander@unh.edu](mailto:lee.alexander@unh.edu)*

Follow this and additional works at: <https://scholars.unh.edu/ccom>



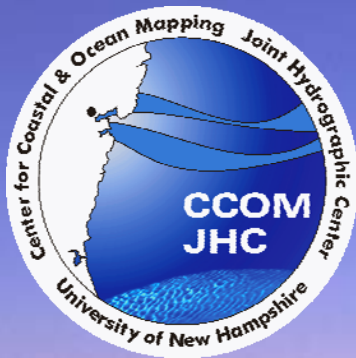
Part of the [Computer Sciences Commons](#), and the [Oceanography and Atmospheric Sciences and Meteorology Commons](#)

---

## Recommended Citation

Schwehr, Kurt and Alexander, Lee, "Right Whale AIS Project (RAP): Acoustic Detections in the Boston Approaches" (2009). *Inland Navigation Technology*. 507.  
<https://scholars.unh.edu/ccom/507>

This Conference Proceeding is brought to you for free and open access by the Center for Coastal and Ocean Mapping at University of New Hampshire Scholars' Repository. It has been accepted for inclusion in Center for Coastal and Ocean Mapping by an authorized administrator of University of New Hampshire Scholars' Repository. For more information, please contact [nicole.hentz@unh.edu](mailto:nicole.hentz@unh.edu).

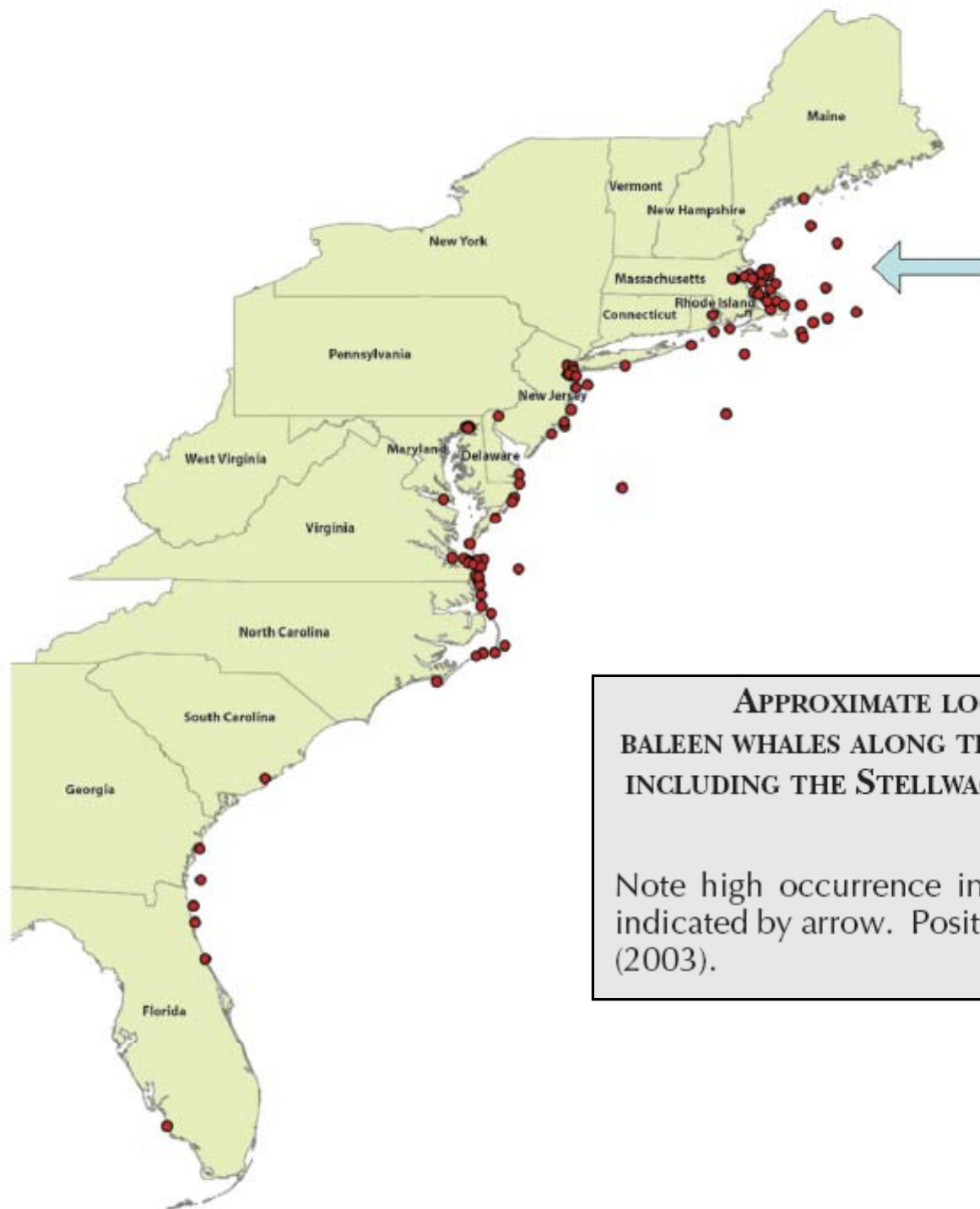


# Right whale AIS Project (RAP)

## Acoustic Detections in the Boston Approaches

**Center for Coastal and Ocean Mapping**  
**NOAA/UNH Joint Hydrographic Center**

Andy Armstrong  
18 Nov 2008

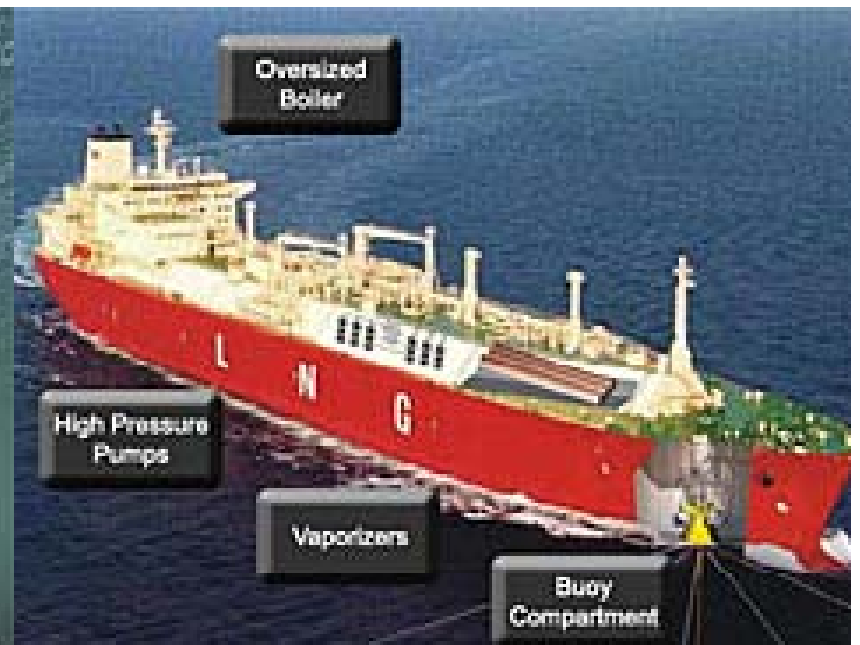
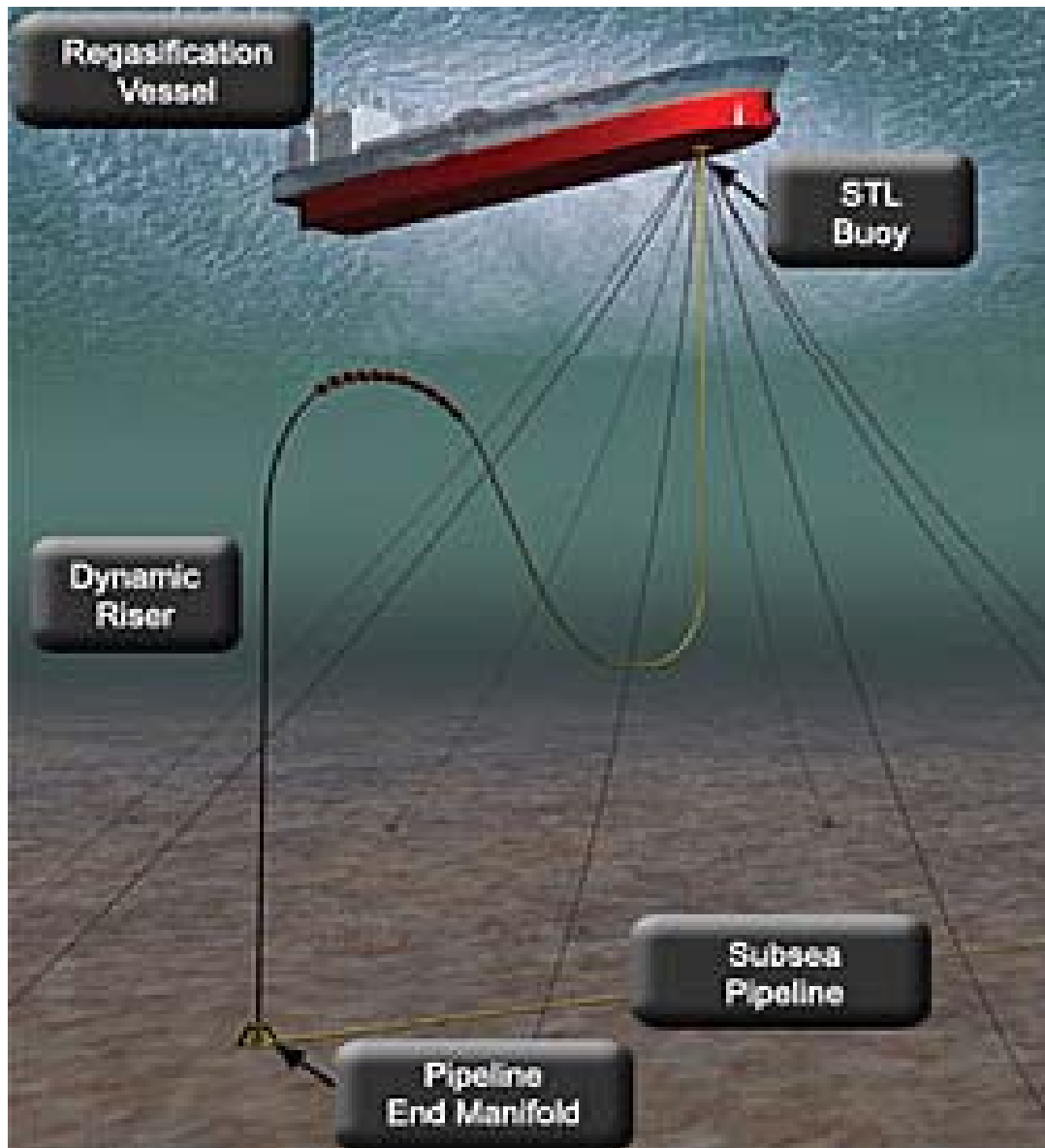


**APPROXIMATE LOCATION OF SHIP STRIKES TO  
BALEEN WHALES ALONG THE EASTERN SEABOARD OF THE U.S.  
INCLUDING THE STELLWAGEN BANK SANCTUARY FROM 1979-  
2002.**

Note high occurrence in and around the sanctuary where indicated by arrow. Positions inferred from Jensen and Silber (2003).

# Liquefied Natural Gas (LNG)

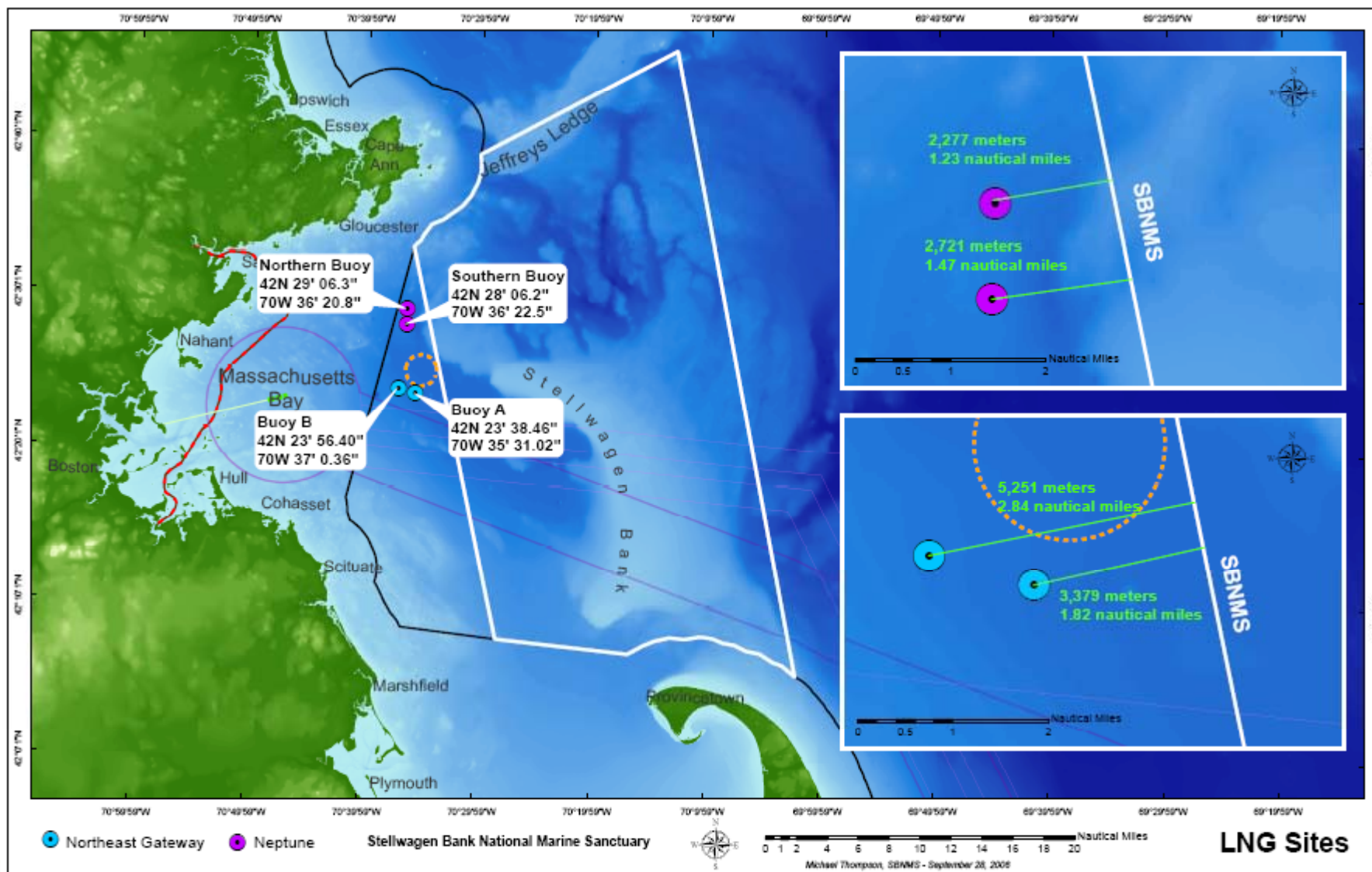
## Deepwater Ports in Massachusetts Bay





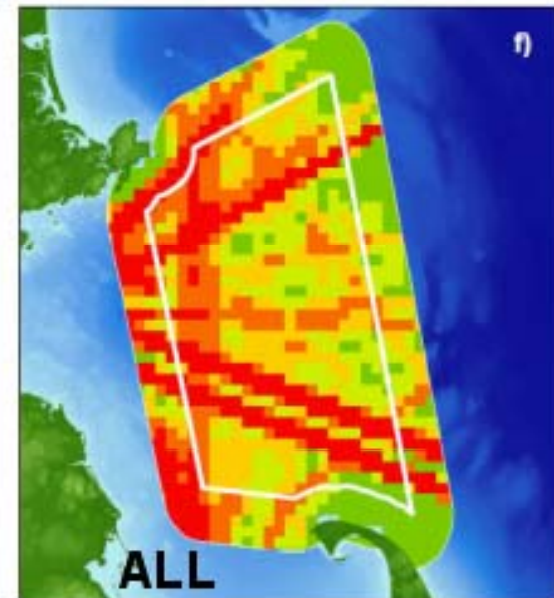
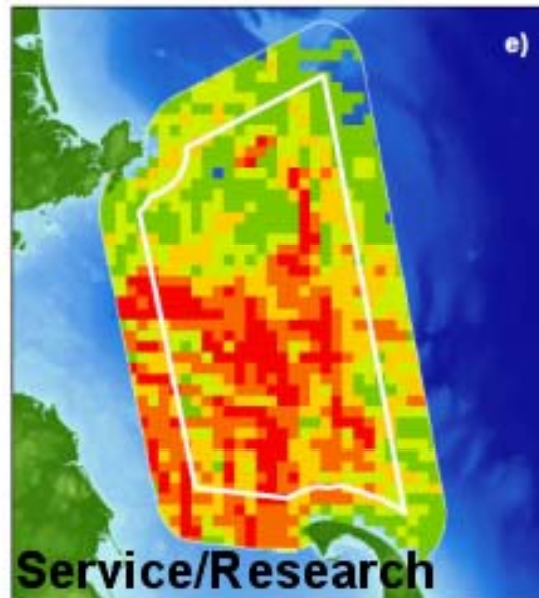
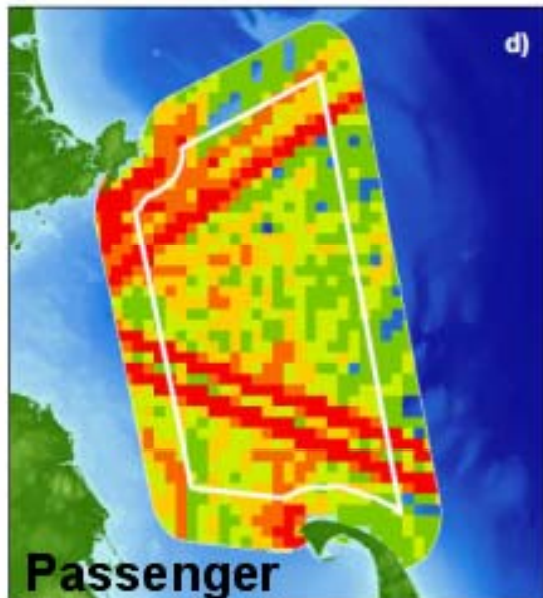
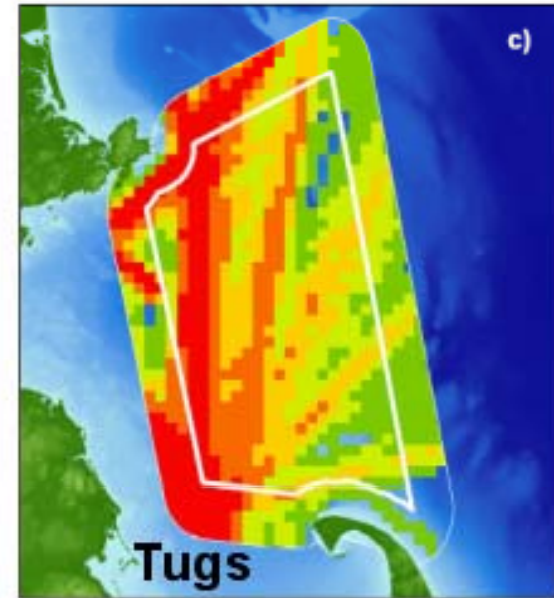
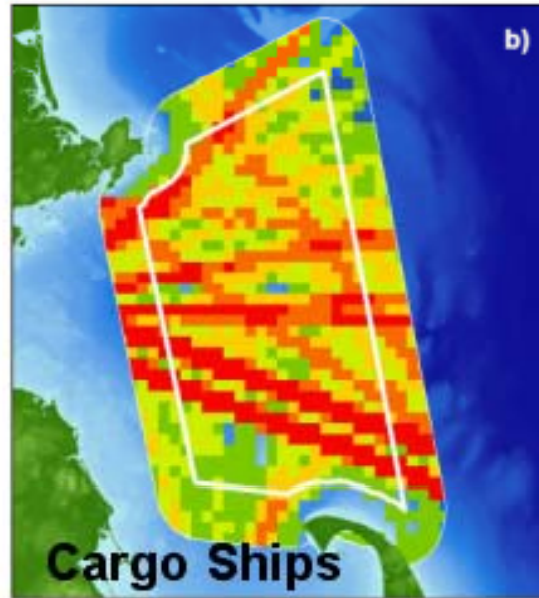
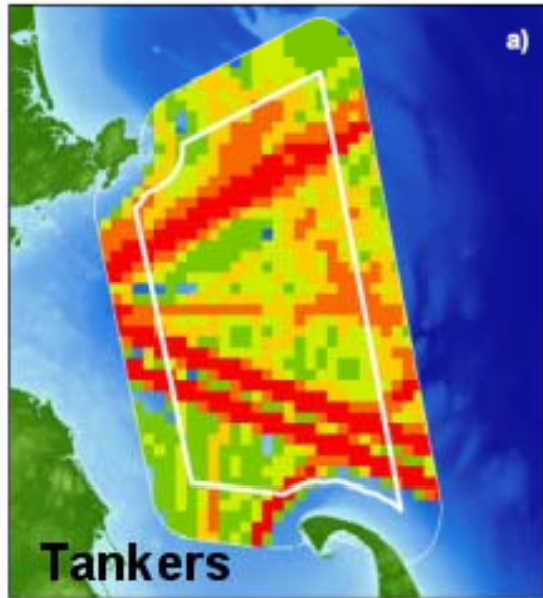
# GERRY E. STUDDS STELLWAGEN BANK NATIONAL MARINE SANCTUARY

## Construction and Operation of Deepwater Ports for LNG



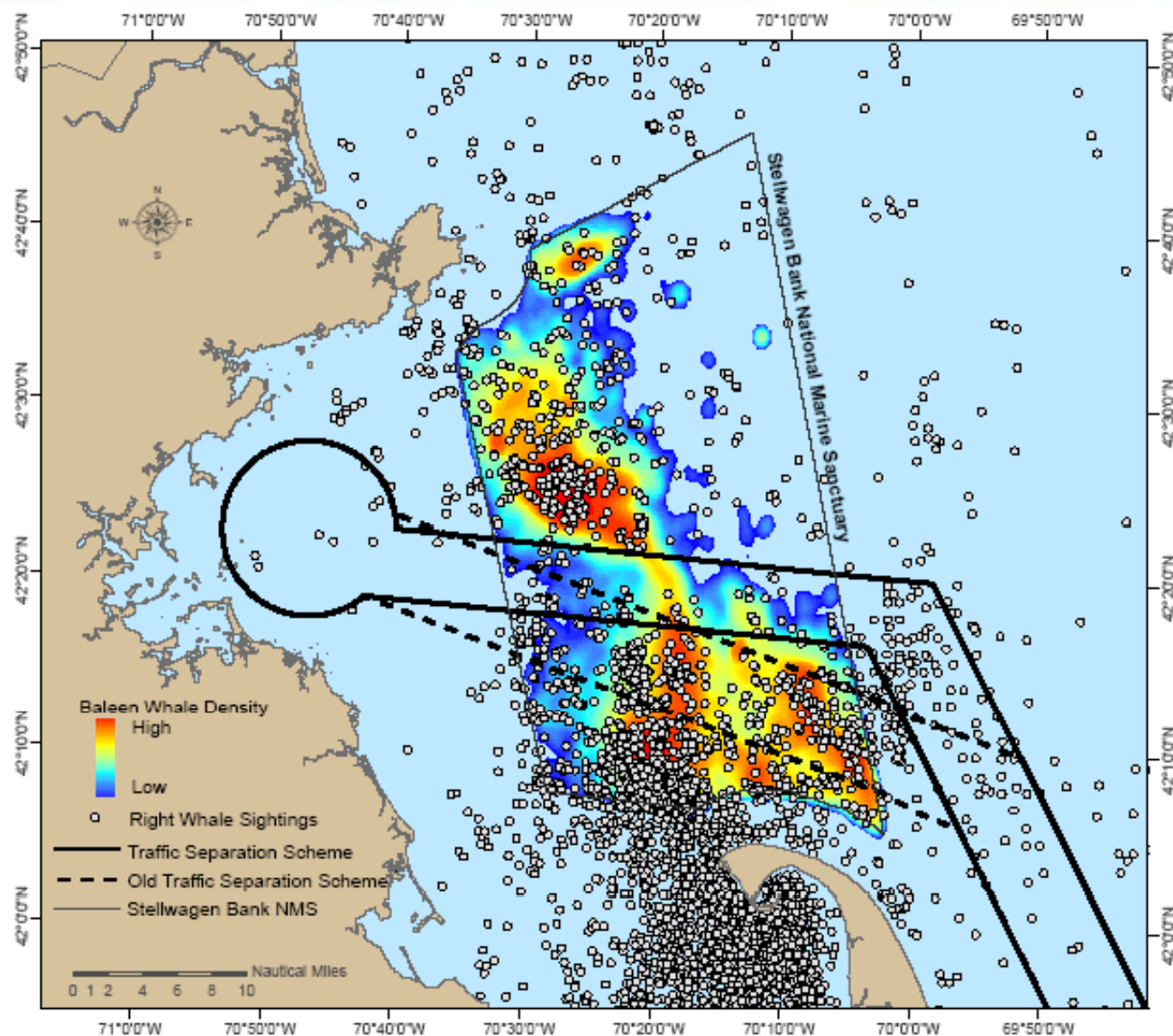


# Vessel Types are Distributed Differently in Space





# GERRY E. STUDDS STELLWAGEN BANK NATIONAL MARINE SANCTUARY



## Original TSS

Humpback 41,742  
Right 402  
Fin 9,365  
Minke 10,233

Total =

**61,742**

## Revised TSS

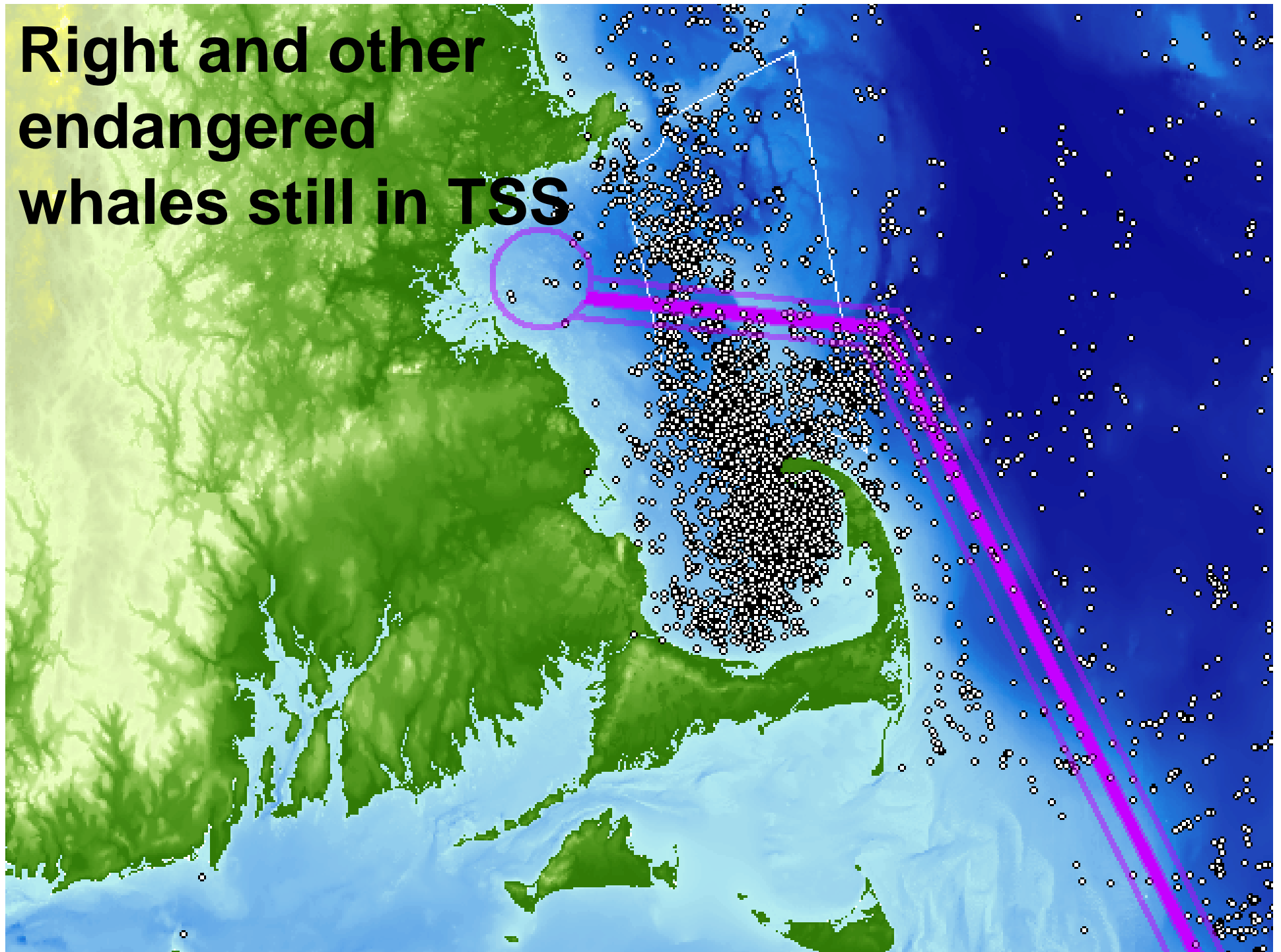
Humpback 7,864  
Right 71  
Fin 2,286  
Minke 1,701

Total =

**11,922**

( 81% reduction in risk)

**Right and other  
endangered  
whales still in TSS**



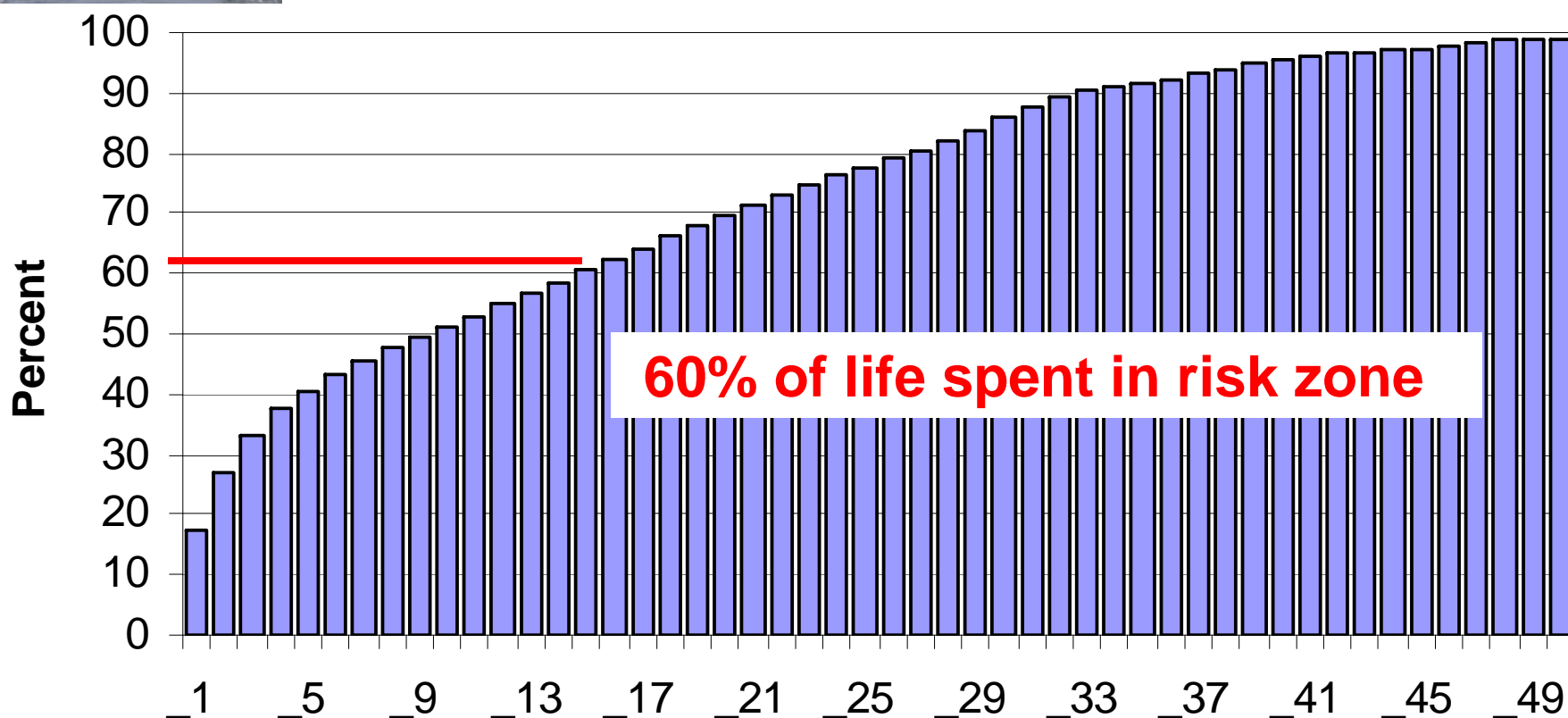




GERRY E. STUDDS  
**STELLWAGEN BANK**  
NATIONAL MARINE SANCTUARY



**Cumulative Time at Depth (05-08) Humpback whales**



**38 Animals; 231.30 hours**

**Depth**

# Using Auto-Buoys to Detect Whale Calls in the Boston TSS

## Partners:

Northeast Gateway & Suez Energy; Cornell University, UNH CCOM, ICAN, IFAW National Park Service, National Marine Fisheries Service, Stellwagen Bank NMS, United States Coast Guard, Woods Hole Oceanographic Institution

## Leads:

NOAA/NMS –	David Wiley
Cornell –	Chris Clark
CCOM/JHC –	Kurt Schwehr



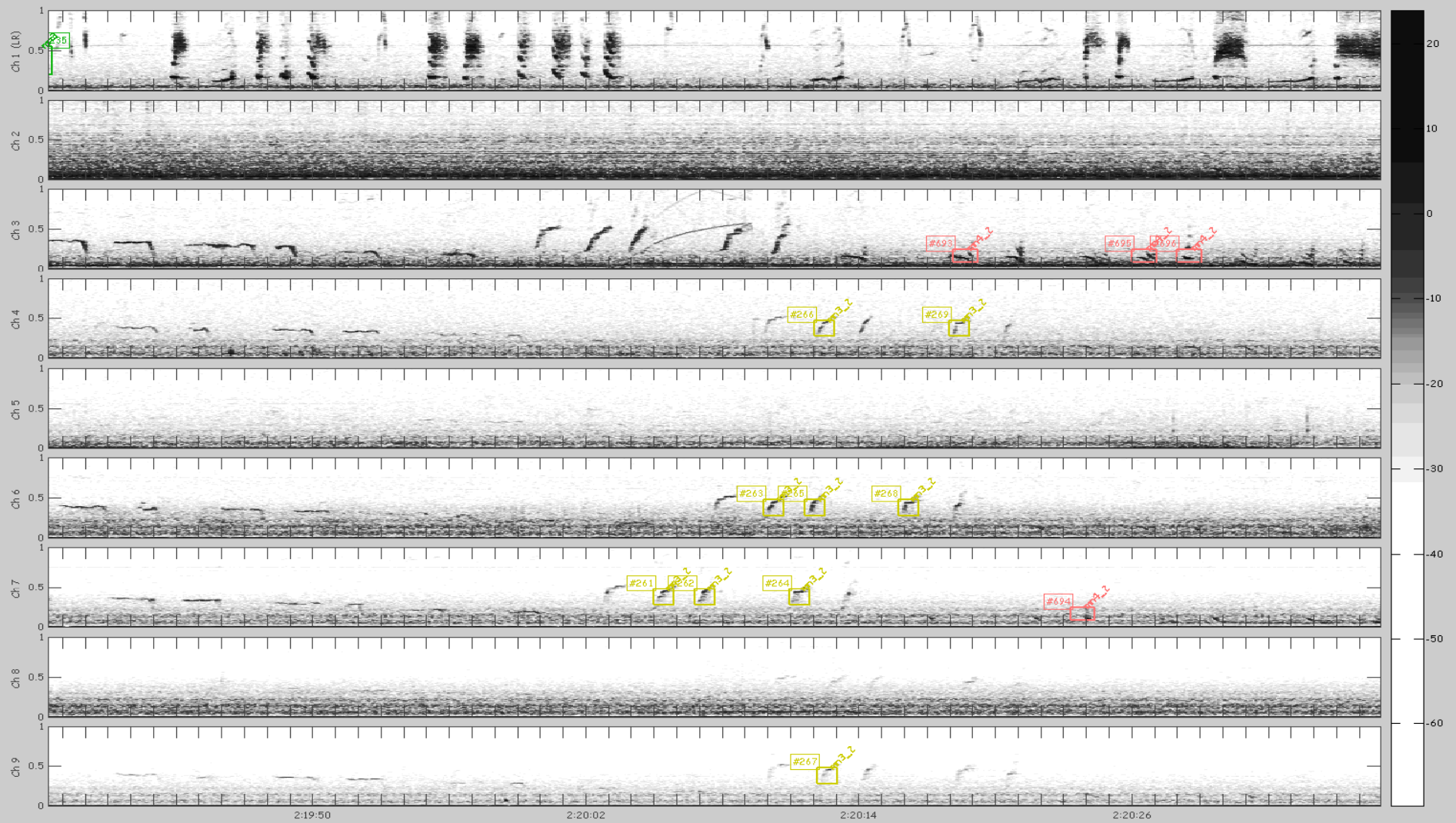
# Auto-Buoys

- **Moored buoys**
- **Hydrophones to detect whale calls**
- **Computer software to identify right whale call**
- **Satellite transmitter to immediately send data to land base for confirmation & communication**



XBAT Sound - 20070415

File Edit View Sound Filter Feature Detect Log Annotate Measure Window Help EXT SVN



513 x 975 x 9 (2.844 sec)

XBAT DEVEL (SVN 582) (MATLAB 7.1)



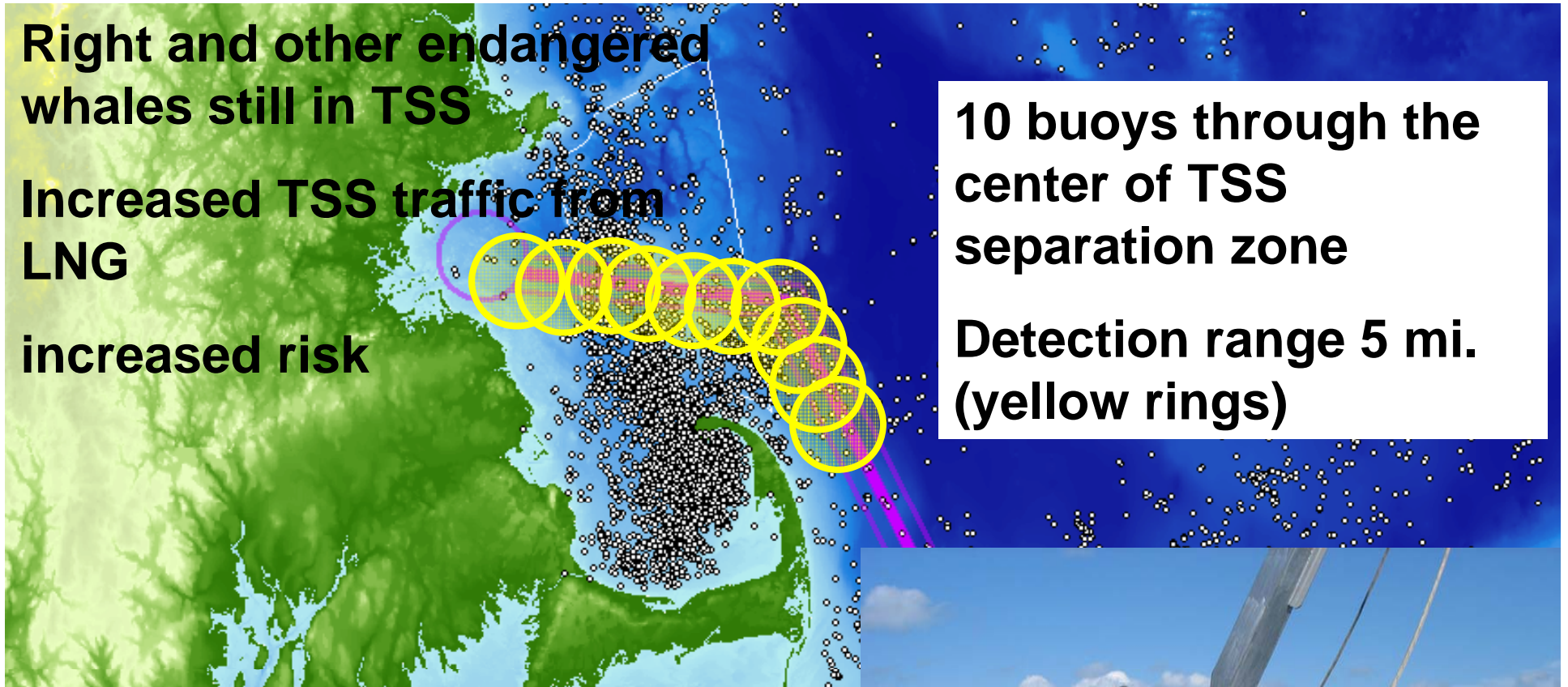
**Right and other endangered  
whales still in TSS**

**Increased TSS traffic from  
LNG**

**increased risk**

**10 buoys through the  
center of TSS  
separation zone**

**Detection range 5 mi.  
(yellow rings)**



**Ship Strike Mitigation for LNG  
Terminal -**

**CG required construction and  
operation of real-time acoustic  
detection buoys in TSS to  
notify LNGs of presence of  
endangered whales**





- 1) Buoys detect a specific right whale call and send detection to land center (Cornell University)
- 2) LNG ship is called





# Right Whale Listening Network

Bioacoustics Research Program

About Right Whales

Threats

Sounds

Solutions

Partnerships



*Learn about the five-step detection process:*

**1. Detect**

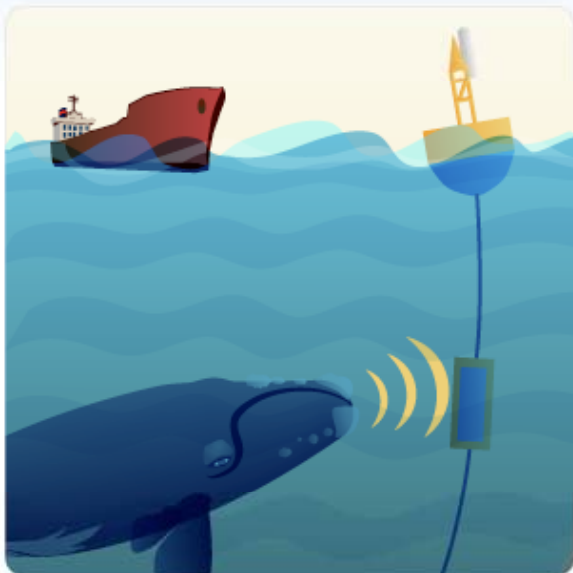
**2. Transmit**

**3. Analyze**

**4. Notify**

**5. Avoid**

## *Whale in the shipping lanes!*



A whale is swimming near the shipping lanes, occasionally making "up-calls" to stay in touch with other whales in the area. Captains of large, fast-moving ships often can't see them in time to avoid collisions.

New auto-detection buoys installed in some shipping lanes monitor the water for right whale calls 24 hours per day. Calls from whales within 5 nautical miles are loud enough to be recorded on the buoy's hydrophone, mounted 60 to 120 feet beneath the surface.

Listen to a right whale's up-call:

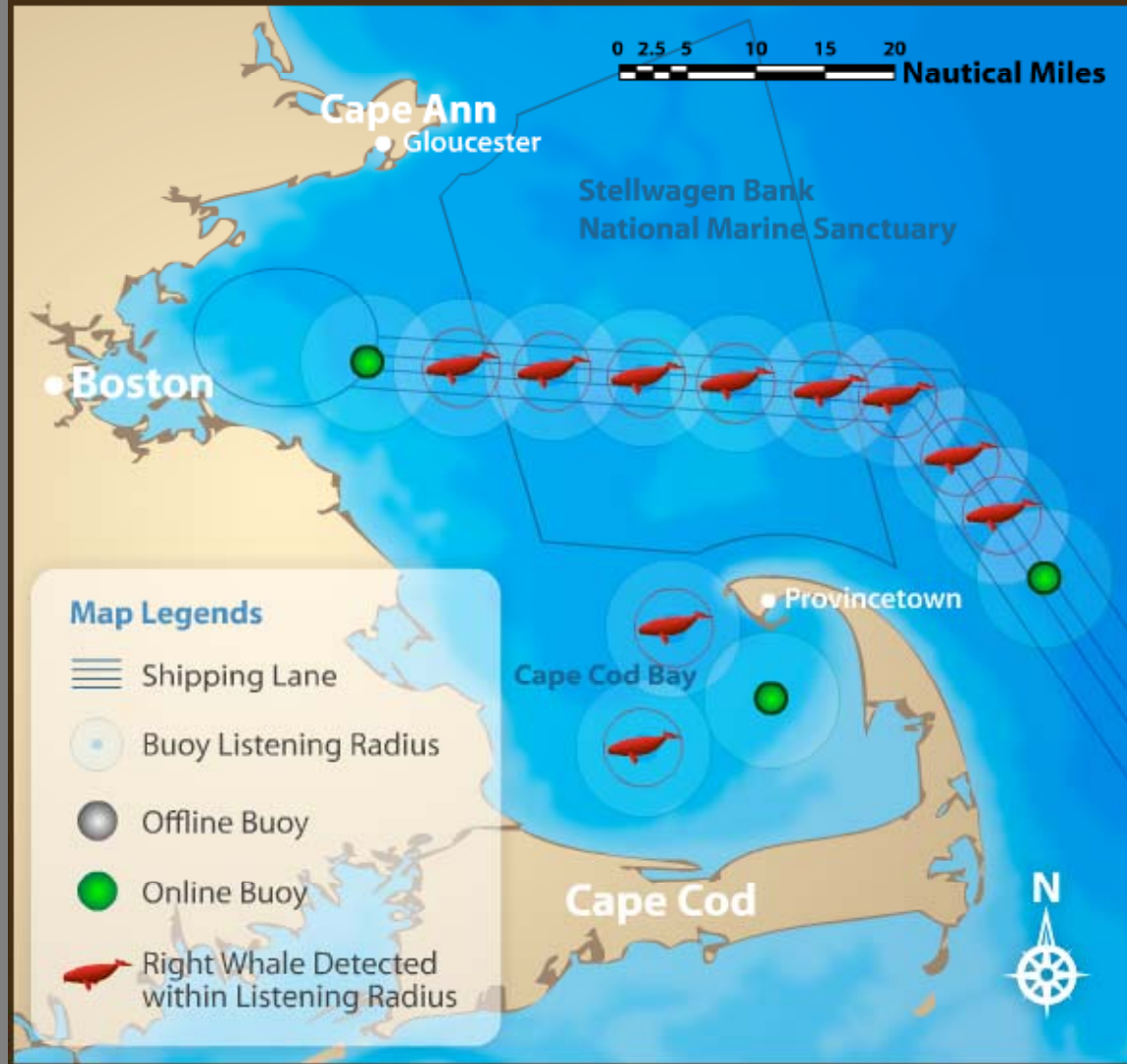


[Step 2 > Transmit the data back to Cornell](#)

# Web based notifications


<http://listenforwhales.org>

227 Right Whale Calls Detected Within 24 Hours.






# Data included in Right Whale Alert Sent by NMFS



## Right Whale Alert



TO: Brenda/Misty Rone/Nelson  
NEFSC/PSB

DATE: 05/05/05 05:07 PM EDT

NEW SIGHTINGS:

2 in the vicinity of the Boston shipping lanes in an 8 nm radius around position 42-09N 069-55W

2 in the vicinity of the Boston shipping lanes in an 8 nm radius around position 41-37N 069-36W

3 in an 8 nm radius around position 41-37N 068-54W

PERSISTENT AGGREGATION

6 in an 8 nm radius around position 42-00N 069-02W

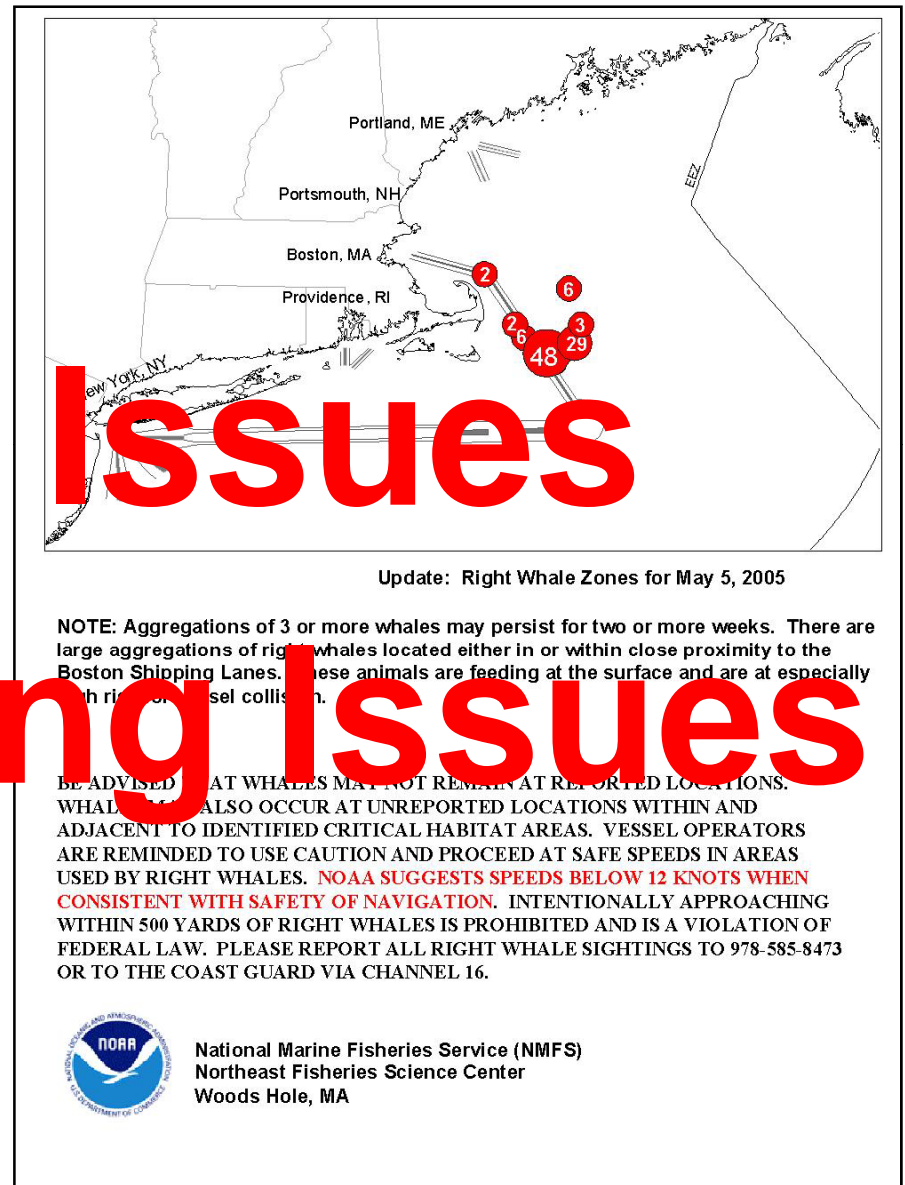
29 in the vicinity of the Boston shipping lanes in an 11 nm radius around position 41-29N 068-58W

48 in the vicinity of the Boston shipping lanes in a 15 nm radius around position 41-19N 069-16W

6 in the vicinity of the Boston shipping lanes in an 8 nm radius around position 41-29N 069-30W

MARINERS ARE URGED TO KEEP A SHARP LOOKOUT AND USE CAUTION AROUND RIGHT WHALES.

PAGES (Including Cover): 2



**A BETTER WAY**

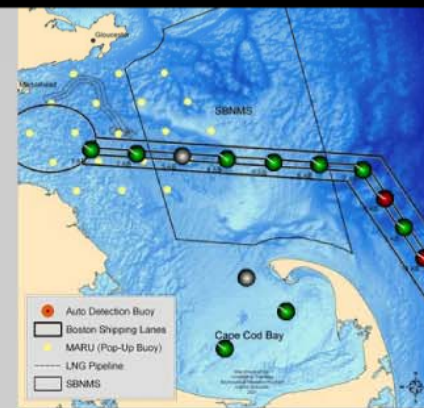
IRIDIUM



## Whales Detected

Last Whale Heard: 2008-01-24 11:34:21 GMT on Buoy TSS-AB10

Current time: 2008-01-24 21:52:25 GMT



Buoys report their status periodically. If they fail to report within 24 hours or have never reported they are considered 'offline.'

### Buoy Modes

- Offline
- Online
- Detection

## Whale Aware Electronic Chart Display

18:40 (hhmm) REMAINING

Right Whale Detected

LNG vessels required to stay below 10 knots

Publication number: 2007-09-23 05:18:00

Whale detected: 2007-09-20 05:18:00

[Additional Information](#)

UTC 16:44:13 Could not pen, vessel is in  
UTC 18:01:32 Could not pen, vessel is in  
UTC 18:02:44 Could not pen, vessel is in

Kurt Schwehr  
CCOM/JHC/SBNMS

USCG

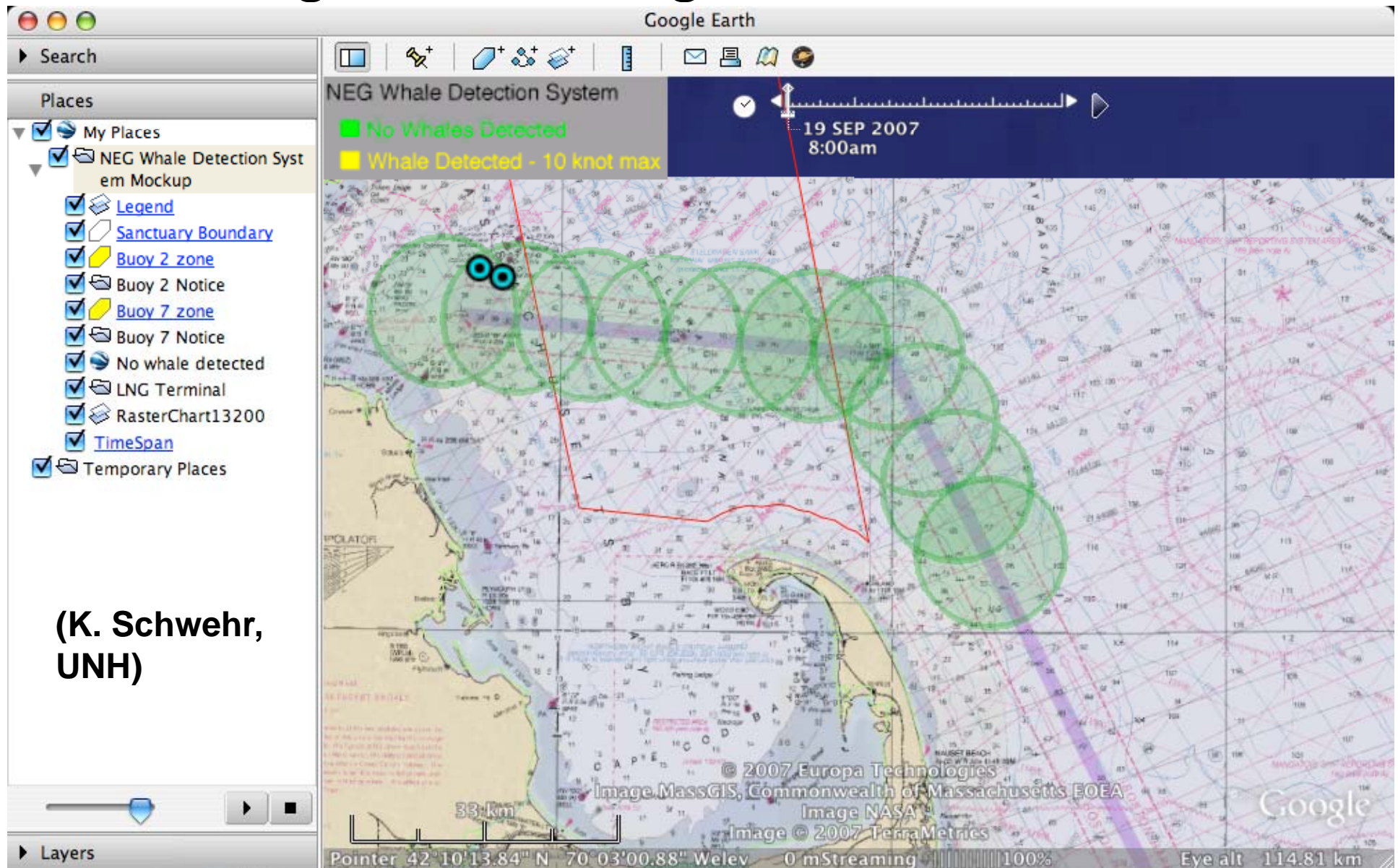
NOAA/Cornell/UNH

Traffic Analysis



# AIS-Based Notification System (LNG)

## All green - no right whale detects

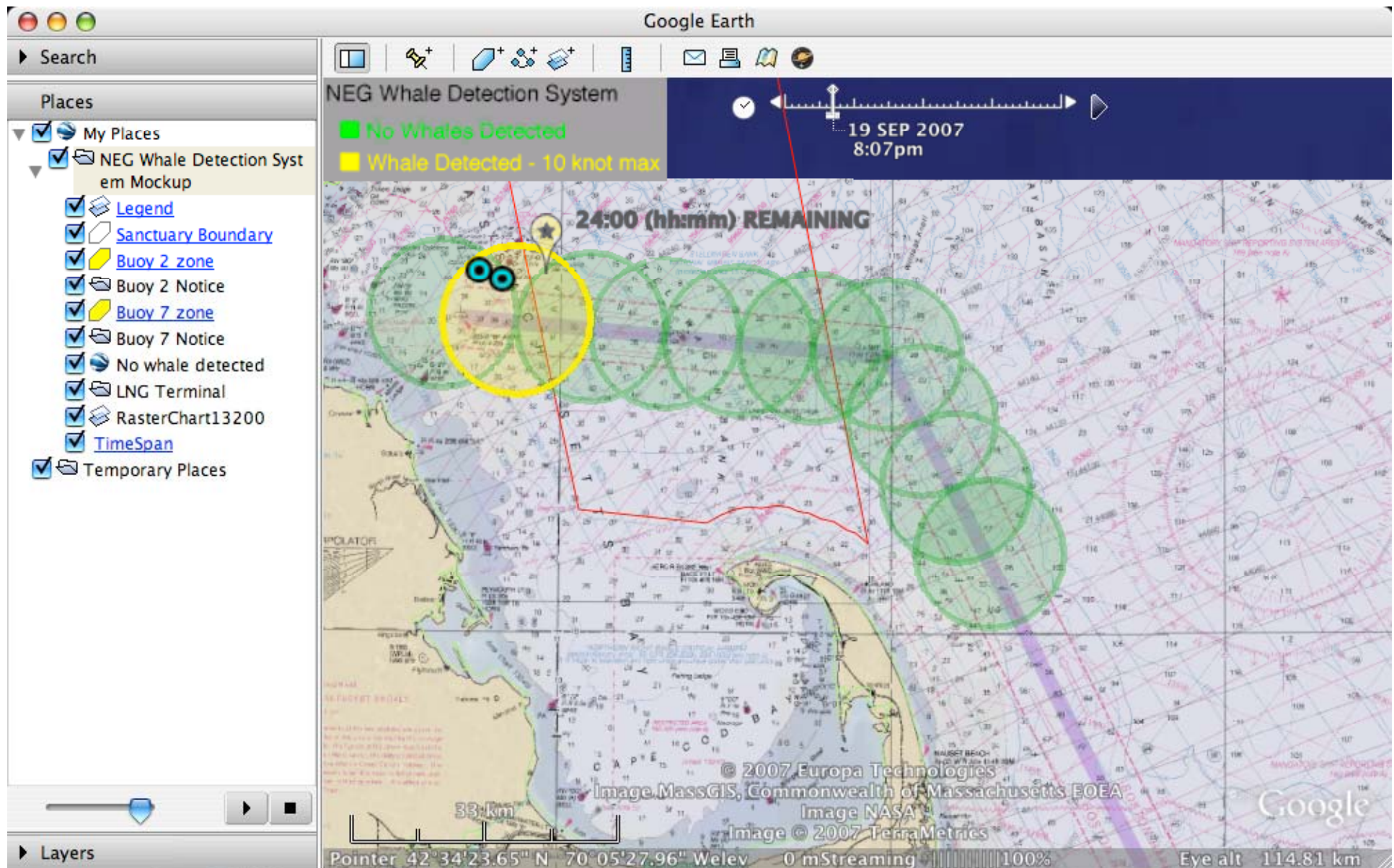


(K. Schwehr,  
UNH)



# Right Whale detected at Buoy 2

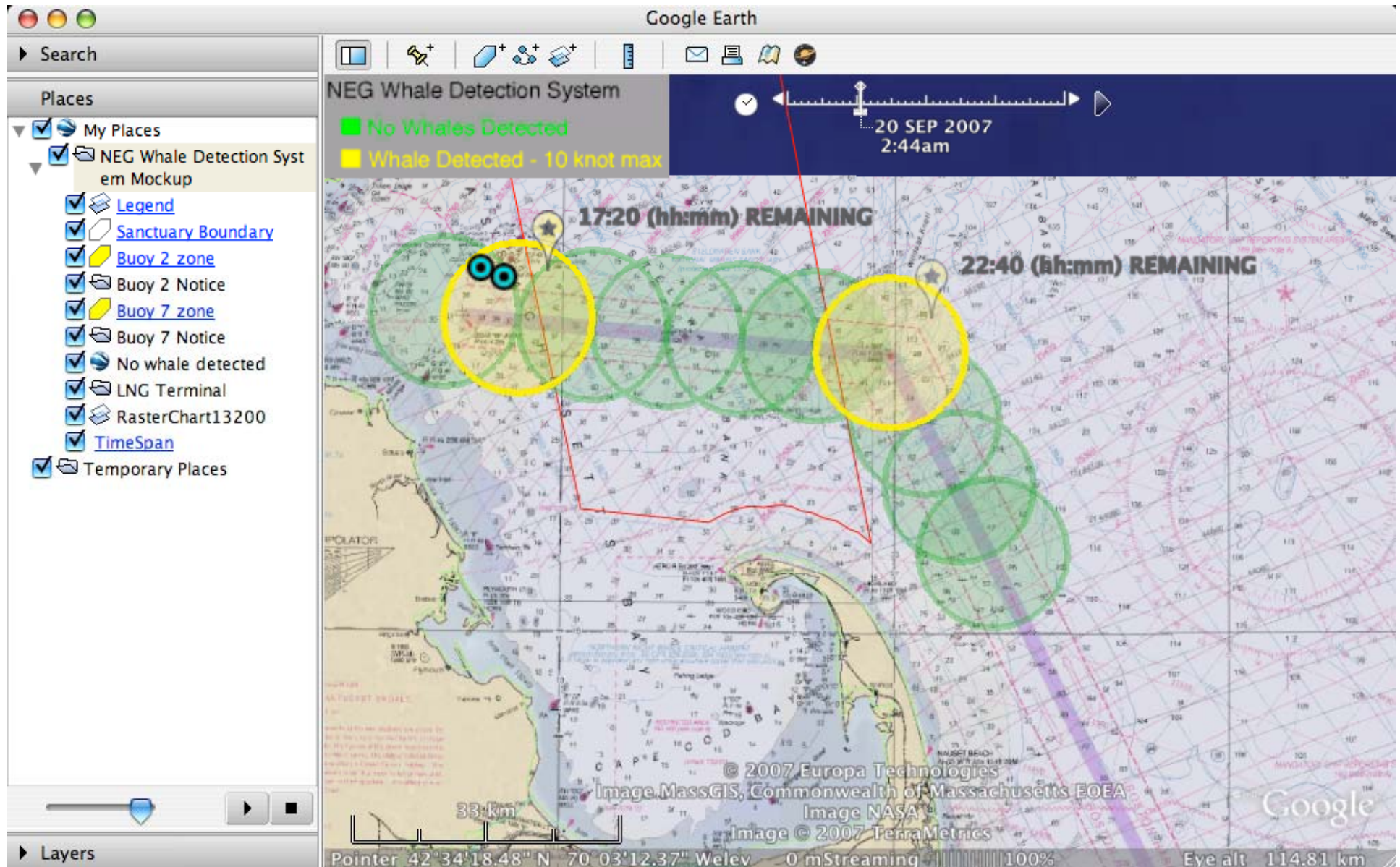
## Begin 24 hr countdown to clearing the speed limit





# Second right whale detection at Buoy 7

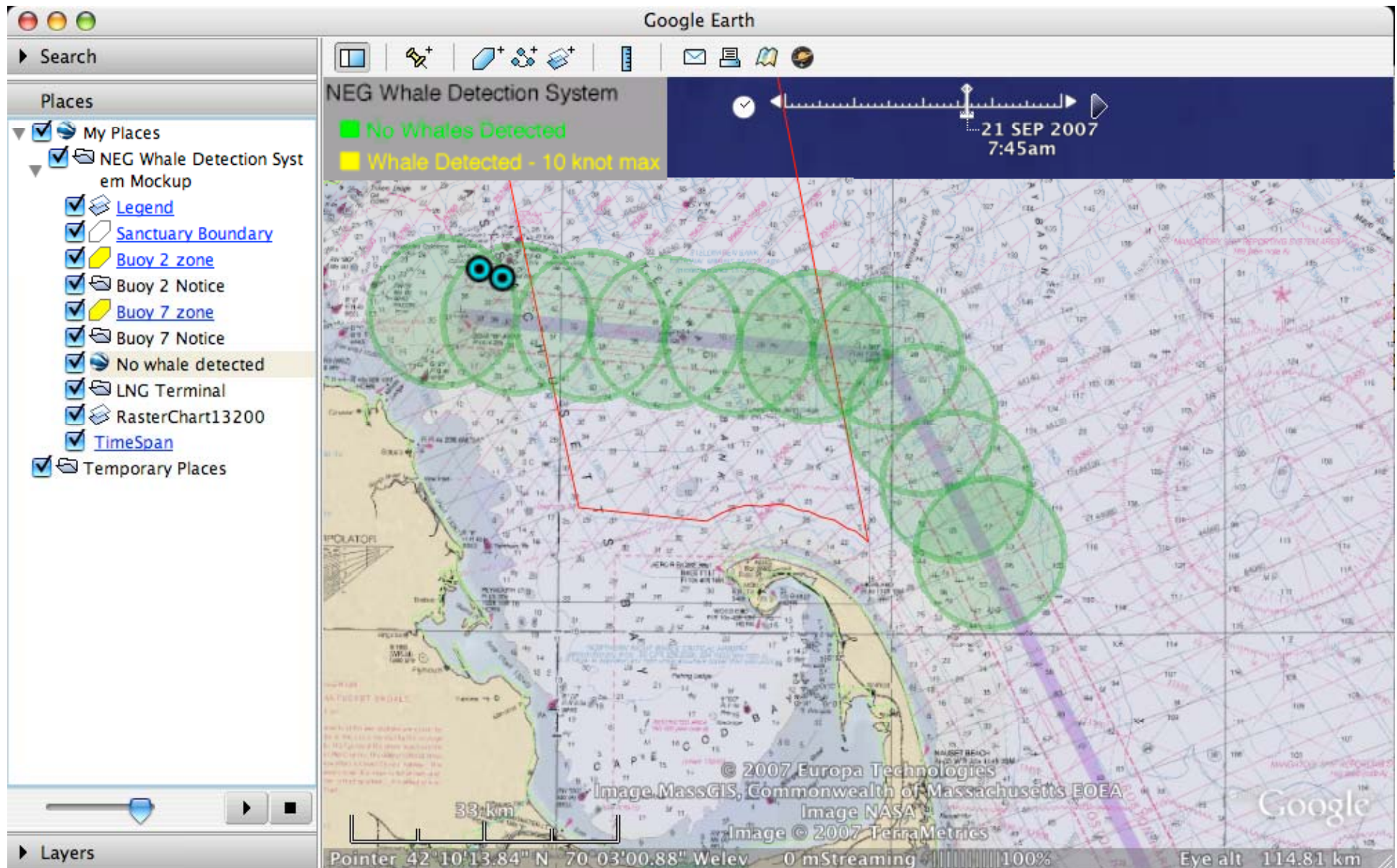
## Now have two separate countdowns

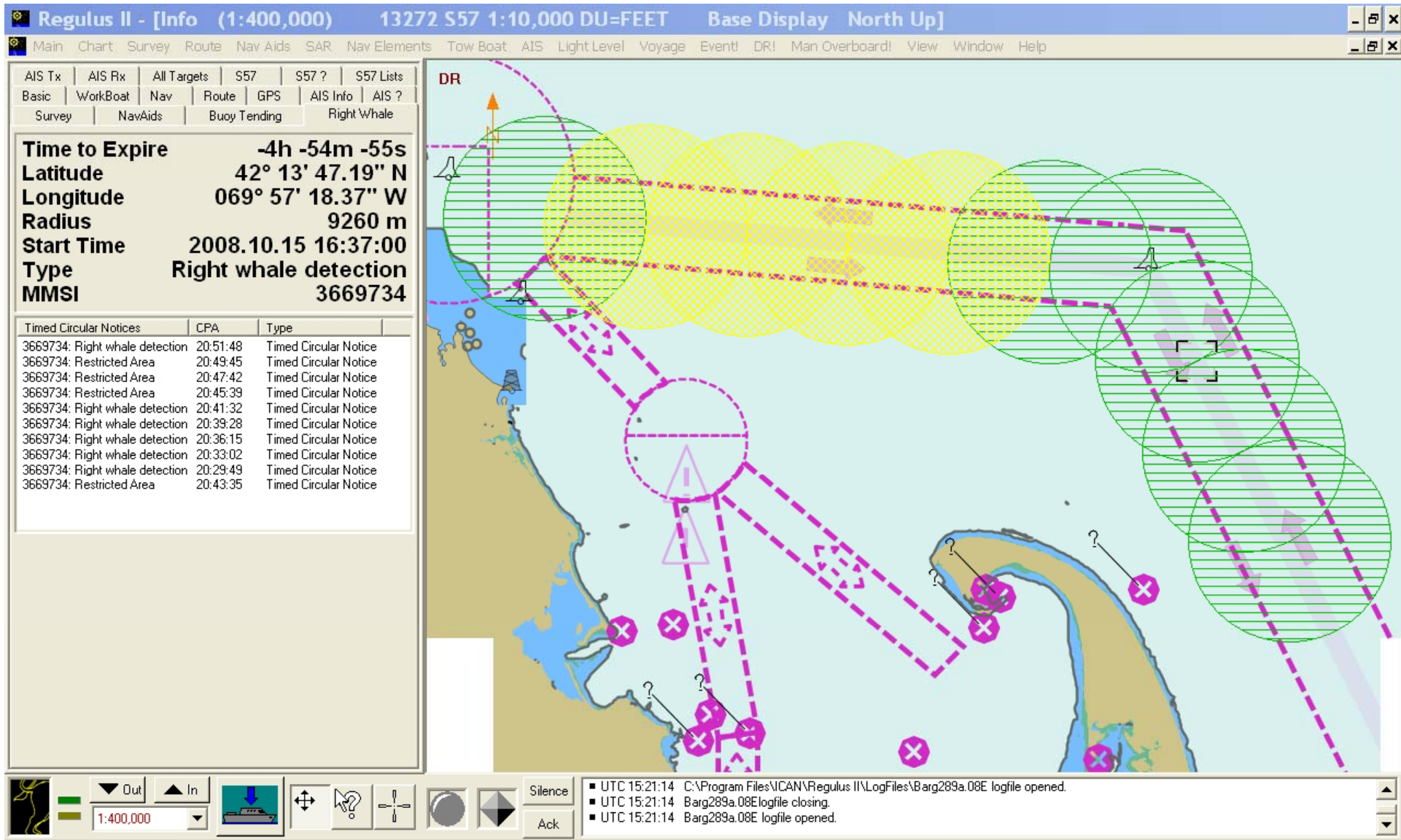




# The detection at buoy 7 expires

## Back to all green - no right whales detected







# Questions?

